

REMARKS

This Amendment is in response to the Office Action mailed on December 1, 2005. All objections and rejections are respectfully traversed.

Claims 1 to 46 are currently pending.

Claims 46 is added to better claim the invention.

Specification Objections

The Applicant has amended the specification to overcome the objections.

35 U.S.C. §112 Rejection

At pages 2-3 of the Office Action, claims 1-45 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant uses the standard definition for a “swarm of messages” which is a “group of messages” as shown in the specification page 5, lines 7-8, which states “a technique for transferring a group of client transaction request entries ... the file system as a swarm of messages.”

Accordingly, Applicant respectfully urges that claims 1-45 are definite under 35 U.S.C. §112, second paragraph.

35 U.S.C. §103 Rejection

At pages 3-11 of the Office Action, claims 1-4, 8-24, and 26-40 were rejected under 35 U.S.C. § 103 as being unpatentable over Fuchs et al. U. S. Patent No. 5,440,726 issued August 8, 1995, hereinafter Fuchs, in view of Karp et al., US Patent No. 5,588,117, hereinafter Karp, and in further view of Jadav et al., US Patent No. 6,128,762, hereinafter Jadav.

The present invention, as set forth in representative claim 1, comprises in part:

1. A system for replay of a backup memory in a storage system having a file system for managing transfer of data to and from an attached disk array, the system comprising:

a log in the backup memory containing the storage system transaction entries accumulated after a consistency point at which time results of the storage system transaction entries are committed to the disk array;

an initiator process that establishes a swarm of messages with respect to the storage system transaction entries and delivers the swarm to the file system; and

a parallel disk information-retrieval process in the file system that is carried out on the swarm of messages.

Applicant's invention performs a parallel disk information-retrieval process in two separate ways. One, the parallel disk information-retrieval process may be accomplished using a plurality of processors, where each processor performs a "LOAD phase" for one transaction entry of the swarm of messages to allow parallel processing of the swarm of messages. The second method uses a single processor processing the swarm of messages in a commingled manner, where the various discrete steps of each LOAD phase

are processed with different transaction entries. (See Specification page 14, line 27 to page 15, line 10).

By way of background, Fuchs describes a computing system that concurrently executes a plurality of different application processes. *See col. 5, line 66 through col. 6, line 4.* The processes communicate with one another by passing messages. *See col. 2, lines 38-42.* Each application process is associated with a corresponding nonvolatile (backup) memory 44 containing logs of the process's incoming and outgoing messages. *See col. 6, lines 12-15 and fig. 1.* The nonvolatile memory also stores the process's "critical" program data, which is transferred to the memory at regular "checkpoint" time intervals. *See col. 3, lines 2-5.* Furthermore, Fuchs system is an in seriatim system because it replays messages in series, one after the other. (Col. 18, lines 36-44) The in seriatim technique was recognized by the Applicant's as a prior art technique and described by the applicant in the Background of the invention on page 4, lines 3-10 on the application as filed.

Karp describes a communication protocol for group ordered message processing. A sending application groups messages together. The messages within the group are then processed in the order they are received. Additionally, the groups of messages are processed in the order sent.

Jadav describes a parallel system for processing blocks. In the system, data is stored over different storage devices. The system uses logical locking to lock blocks while a write is being processed.

Applicant respectfully urges that cited patents, Fuchs, Karp and Jadav, are completely silent concerning Applicant's claimed novel *an initiator process that establishes a swarm of messages with respect to the storage system transaction entries ... a disk information-retrieval process in the file system that is carried out on the swarm of messages in parallel*. In further detail, Applicant's invention processes messages in the swarm in parallel by processing the messages that do not require a prerequisite transaction at the same time by using multiple processors or a single processor using a commingled process. Additionally, the messages that require a prerequisite are returned with "reload" message to process later. This method allows the system to run in parallel without locking blocks while processing the swarm of messages. In contrast, Jadav describes locking the blocks when a write occurs to prevent a read from processing the wrong information. Additionally, Karp processes messages in a group of messages, in the order that the messages were received. Karp describes *in seriatim*, or in serial processing like Fuchs.

Accordingly, Applicant respectfully urges that Fuchs, Karp, and Jadav, taken either singly or in combination, are legally precluded from rendering Applicant's claimed novel invention unpatentable under 35 U.S.C. 103 (a) because of the absence from the cited art of Applicant's claimed novel *an initiator process that establishes a swarm of messages with respect to the storage system transaction entries ... a parallel disk information-retrieval process in the file system that is carried out on the swarm of messages*.

At Page 11 of the Office Action, claims 5 and 25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fuchs, Karp, and Jadav, and in further view of Park, US Patent Application publication number 2003/0131190 published on July 10, 2003.

Applicant respectfully notes that Claims 5 and 25 are dependent claims, and are dependent from independent claims which are believed to be in condition for allowance.

At page 12 of the Office Action, claims 6 and 7 were rejected under 35 U.S.C. 103(c) as being unpatentable over Fuchs, Karp, and Jadav, and in further view of Creighton U. S. Patent No. 6,330,570 issued on December 11, 2001 (hereinafter Creighton).

Applicant respectfully notes that Claims 6 and 7 are dependent claims, and are dependent from independent claims which are believed to be in condition for allowance.

At pages 14-15 of the Office Action Claims 41-45 were rejected under 35 U.S.C. 103 as being unpatentable over Fuchs in view of Karp.

The present invention, as set forth in representative claim 41, comprises in part:

41. A file system, comprising:

a backup memory storing a plurality of file system transaction entries;

a first process that establishes *a swarm of messages with respect to the file system transaction entries and delivers the swarm of messages to the file system*;

a second process that performs a parallel LOAD phase manner for a plurality of messages in the swarm of messages; and

a third process that performs a MODIFY phase for at least some messages in the swarm of messages, the MODIFY phase operating on messages based on the order in which file system transaction entries were stored in the backup memory.

Applicant respectfully urges that both cited patents, Fuchs and Karp, are completely silent concerning Applicant's claimed novel *a swarm of messages with respect to the file system transaction entries and delivers the swarm of messages to the file system, a second process that performs a parallel LOAD phase for a plurality of messages in the swarm of messages*. In further detail, Applicant's invention processes a LOAD phase on the messages in the swarm of messages concurrently or in parallel. Where the process is done in parallel by using multiple processors or a single processor processing in a commingled manner. One way a commingled process is accomplished is:

“where each swarm message LOAD (A-C) requires ten discrete steps (1-10), the processor may carry out (for example) A-2, followed by B-2, followed by C-2, followed by C-3, followed by A-3, each occurring as soon as the processor is ready for the next task, and so on, until complete. According to this interleaved approach, multiple steps in the same message (C-2, C-3 for example) can be accomplished before the next message is “worked on” (example A-3). This contrasts with the prior approach of carrying out A-1 to A-10, before transferring and processing B-1 to B-10.” (Specification, page 15, lines 1-8)

In contrast, Karp describes processing the messages, within the group of messages, in the order they are received. In other words, Karp processes the messages within the group in series like Fuchs. Fuchs describes replaying the received messages since the last checkpoint in the receiver log file. (Col. 18, lines 25-30). Furthermore, Karp and Fuchs are totally silent about *a second process that performs a parallel LOAD phase for a plurality of messages in the swarm of messages* because Fuchs and Karp perform the processing in series compared to Applicant's concurrent process.

Accordingly, Applicant respectfully urges that both Fuchs, and Karp, taken either singly or in combination, are legally precluded from rendering Applicant's claimed novel invention unpatentable under 35 U.S.C. 103 (a) because of the absence from both patents of Applicant's claimed novel *a swarm of messages with respect to the file system transaction entries and delivers the swarm of messages to the file system, a second process that performs a parallel LOAD phase manner for a plurality of messages in the swarm of messages.*

All independent claims are believed to be in condition for allowance.

All dependent claims are dependent from independent claims which are believed to be in condition for allowance. Accordingly, all dependent claims are believed to be in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,



Shannen C. Delaney
Reg. No. 51,605
CESARI AND MCKENNA, LLP
88 Black Falcon Avenue
Boston, MA 02210-2414
(617) 951-2500